



Vos, T., Kyu, H. H., Pinho, C., Wagner, J. A., Brown, J. C., Bertozzi-Villa, A., Charlson, F. J., Coffeng, L. E., Dandona, L., Erskine, H. E., Ferrari, A. J., Fitzmaurice, C., Fleming, T. D., Forouzanfar, M. H., Graetz, N., Guinovart, C., Haagsma, J., Higashi, H., Kassebaum, N. J., ... Murray, C. J. L. (2016). Global and national burden of diseases and injuries among children and adolescents between 1990 and 2013: findings from the global burden of disease 2013 study. *JAMA Pediatrics*, 170(3), 267-287.
<https://doi.org/10.1001/jamapediatrics.2015.4276>

Peer reviewed version

Link to published version (if available):
[10.1001/jamapediatrics.2015.4276](https://doi.org/10.1001/jamapediatrics.2015.4276)

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**Global and national burden of diseases and injuries among children and adolescents
between 1990 and 2013: findings from the Global Burden of Disease 2013 Study**

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Revision Date:

11 Nov 2015

Word count

Main text: 5317

Abstract

Importance: The current literature focuses on mortality among children younger than five years. Comparable information on non-fatal health outcomes among these children and the fatal and non-fatal burden of diseases and injuries among older children and adolescents is scarce.

Objective: To determine levels and trends in the fatal and non-fatal burden of diseases and injuries among younger children (<5 years), older children (5-9 years) and adolescents (10-19 years) between 1990 and 2013 in 188 countries from the Global Burden of Disease (GBD) 2013 study.

Evidence Review: Data from vital registration, verbal autopsy, maternal and child death surveillance, and other sources covering 14,244 site-years (i.e. years of cause of death data by geography) from 1980 through 2013 were used to estimate cause-specific mortality. Data from 35,620 epidemiological sources were used to estimate the prevalence of the diseases and sequelae included in the GBD. Cause-specific mortality for most causes was estimated using the Cause of Death Ensemble model strategy. For some infectious diseases (e.g., HIV/AIDS, measles, hepatitis B) where the disease process is complex or the cause of death data were insufficient or unavailable, we used natural history models. For most non-fatal health outcomes, DisMod-MR 2.0, a Bayesian meta-regression tool was used to meta-analyze the epidemiological data to generate prevalence estimates.

Findings: Of the 7.7 million deaths among children and adolescents globally in 2013, 6.3 million occurred among younger children, 0.48 million among older children, and 0.97 million among adolescents. In 2013, lower respiratory infections were the leading cause of death among younger children (905,059 deaths), diarrheal diseases among older children (38,325 deaths), and road injuries among adolescents (115,186 deaths). Iron deficiency anemia was the leading cause

of years lived with disability among children and adolescents affecting 619 million prevalent cases in 2013. Large between-country variations exist in mortality from leading causes among children and adolescents. Countries with rapid declines in all-cause mortality between 1990 and 2013 also experienced large declines in most leading causes of death, whereas countries with the slowest declines had stagnant or increasing trends in the leading causes of death. In 2013, Nigeria had a 12% share of global lower respiratory infections deaths and a 38% share of global malaria deaths. India had 33% of the world's neonatal encephalopathy deaths. Half of world's diarrheal deaths among children and adolescents occurred in just five countries: India, Democratic Republic of the Congo, Pakistan, Nigeria, and Ethiopia.

Conclusions and Relevance: Understanding the levels and trends of the leading causes of death and disability among children and adolescents is critical to guide investment and inform policies. Monitoring these trends over time is also key to understanding where interventions are having an impact. Proven interventions exist to prevent or treat the leading causes of death and disability among children and adolescents. The findings presented here show that these are underutilized and give guidance to policy makers in countries where more attention is needed.

Introduction

The current literature focuses on mortality rates and time trends among children younger than five years. There is little comparable information on the fatal and non-fatal burden of diseases and injuries among older children and adolescents. Children and adolescents constitute about a third of the world's population and their health status is important for every country and society.

Global mortality rates among younger children (< 5 years old) have been declining since 1990 but striking variations in both the levels and trends exist across countries.^{1,2} For example, the number of under-five deaths per 1000 live births varied from 2.3 (95% uncertainty interval (UI): 1.8-2.9) in Singapore to 152.5 (95% UI: 130.6 to 177.4) in Guinea-Bissau in 2013.² The annualized rates of change in mortality of younger children for 1990-2013 varied from -6.8% in Oman to 0.1% in Zimbabwe, and only 27 out of 138 developing countries are estimated to achieve the target of the Millennium Development Goal 4 of a two-thirds reduction of 1990 mortality levels by 2015 (equivalent to an annualized rate of change of -4.4%).² Although between-country variations in mortality among younger children have been reported, information on non-fatal health outcomes among these children is scarce. Moreover, there has been little systematic data collection and reporting on the fatal and non-fatal burden of diseases and injuries among older children and adolescents. Knowing the current burden and trends of the leading causes of death and disability in these age groups is critically important to shed light on areas that need more attention. In this study, we identified levels and trends in the fatal and non-fatal burden of diseases and injuries among younger children (<5 years), older children (5-9 years) and adolescents (defined by the United Nations as those aged 10-19 years³) for 1990-2013 in 188 countries based on the results from the Global Burden of Disease 2013 study.

Methods and data sources

Detailed methods of the Global Burden of Disease (GBD) study have been published elsewhere^{1,4-6} and we provide only a brief description here. The study components relevant to the present paper are shown in eFigure 1.

Cause-specific mortality was estimated using a database of vital registration, verbal autopsy, maternal and child death surveillance, and other sources covering 14,244 site-years (the number of years for which cause of death data were available for a particular geographic area such as a country or demographic surveillance site) from 1980 to 2013.¹ Of the 14,244 site-years, 5039 site years were from vital registration systems, 3860 from cancer registry, 1798 from sibling history, 1433 from police records, 1430 from surveillance, 538 from verbal autopsy, and 146 from other sources including surveys, census, hospital, and burial or mortuary. The quality and comparability of the cause of death data were assessed and enhanced through multiple steps which have been reported in detail previously.¹ Sample key steps include developing more than 100 maps to convert causes of death observed in the raw data to the GBD 2013 cause list, and identifying deaths being assigned to ill-defined or intermediate rather than underlying causes of death, which were redistributed to more specific underlying causes.^{1,7} Moreover data that were reported in aggregated categories were split into estimates of age-sex-specific deaths using the observed global pattern of relative risks of death for a cause by age and sex and the local age-sex distribution of the population.⁷ Country-specific data sources and citations for each cause and data before and after redistribution are shown in the online data visualization of the cause of death database at <http://vizhub.healthdata.org/cod/>. For most causes, we used the Cause of Death Ensemble model (CODEm) strategy^{1,7-9} which has been widely used for generating global health

estimates. The CODEm strategy evaluates a large number of potential models that apply different functional forms (mixed effects models and space-time Gaussian Process Regression models) to mortality rates or cause fractions with varying combinations of predictive covariates. An ensemble of models that performs best on out-of-sample predictive validity tests is selected for each cause of death. For some infectious diseases (e.g., HIV/AIDS, measles, hepatitis B) where the disease process is complex or the cause of death data were insufficient or unavailable, we used natural history models (i.e., models developed based on the natural history of diseases). For example, the natural history model for HIV/AIDS took into consideration the nature of HIV epidemics in particular countries, and HIV mortality rates among those on and those off antiretroviral therapy, which were not captured in the cause of death data.¹⁰ Years of life lost due to premature mortality (YLLs) were calculated by multiplying the number of deaths at each age by a standard life expectancy at that age.^{1,7}

The prevalence of diseases and their disabling consequences, called sequelae in the GBD, were estimated using an epidemiological database compiling data from systematic reviews on prevalence, incidence, remission, mortality risk and severity distributions of the diseases and injuries included in the GBD. There were 35,620 data sources (mainly covered from 1990 to 2013) that include studies published in the scientific literature, nationally-representative household surveys, antenatal clinic surveillance data, disease notifications, disease registries, hospital admissions data, outpatient visit data, population-based cancer registries, and other administrative data. Household surveys including the Demographic and Health surveys, Multiple Indicator Cluster Surveys, Living Standards Measurement Studies, Reproductive Health Surveys, and other national health surveys included in the Global Health Data Exchange were

systematically screened for relevant data. For some diseases (e.g. measles and pertussis), case notifications reported to the World Health Organization up to 2013 were used as input data. A full list of citations for sources organized by country are available in the appendix of a previous GBD paper (pp 97–653).⁵ Epidemiological data for most causes were meta-analyzed with DisMod-MR 2.0,⁵ a Bayesian meta-regression tool, which adjusts for variations in study methods between data sources and enforces consistency between data for different parameters, such as incidence and prevalence. The tool evaluates all the data through a geographical cascade of four levels (global, super-region, region, and country). At first, all data in the world are evaluated to estimate the fixed effects on age, sex, study-level and country-level covariates and the random effects for countries, regions and super-regions (we grouped regions into seven super-regions for analytical purposes¹¹). The outputs of the global level are then used as prior information for the next, super-region level of the cascade. After fitting the model to each super-region's data, the results are fed as priors to the region-specific fits and finally, region fits are used as a prior when modelling a country's results for a particular time period. For countries and time periods for which little or no data are available, the estimation is facilitated by country characteristics and random effects on super-region, region and country. For this purpose, a database of country covariates for 93 topic areas and 242 variants was created, using data from household surveys, censuses, official reports, administrative data, and systematic reviews.^{1,5} The sources and imputation methods used to generate time series for the covariates have been reported previously.¹ DisMod-MR 2.0 also allows the user to add strong prior knowledge on the age pattern and/or epidemiological parameters including incidence, remission and excess mortality rate. For example, major depressive disorder cannot be detected at very young ages, and we set a prior of zero incidence in children younger than 4 years. The assumptions and priors by

individual condition have been reported in the appendix of a previous GBD paper (pp 654–684).⁵ Years lived with disability (YLDs) were computed by multiplying the prevalence of each sequela by a disability weight.⁵ Since we applied disability weights to prevalence in calculating YLD, the most prevalent cause of disability (defined as any departure from full health) is not necessarily the leading cause of YLD. For instance, mild vision impairment and caries are very common but cause relatively little disability.

Disability weights for a set of 235 health states were estimated by pair-wise comparison methods presenting pairs of lay health state descriptions to respondents in surveys conducted among the general population in nine countries and an open web-based survey.¹² Each of the 2337 sequelae defined for 301 diseases and injuries mapped to one or a combination of the 235 health states. Sequelae are the direct consequences of disease or injury.¹¹ Sequelae that are common across different diseases or injuries are called health states.¹¹ For example, severe anemia due to malaria is a sequela that shares the health state of severe anemia with a number of other diseases such as hookworm disease and maternal hemorrhage. Disability-adjusted life-years (DALYs) were computed as the sum of YLLs and YLDs for each country, age, sex and year. A full list of causes of death and disability and the corresponding ICD codes have been reported in previous GBD papers.^{1,5}

The GBD classifies countries into developed (Australasia, North America, all of Europe, Brunei, Japan, Singapore and South Korea) and developing (all other countries) rather than using the World Bank income classification of low, middle and high income countries. As the income status of a country may change over time, it makes reporting on time series for country

groupings with a varying composition more difficult. Although we realize that the inclusion of some countries in either developed or developing is controversial, we have opted to use the GBD classification in this paper as it illustrates important differences in the levels and trends of mortality and DALY rates between the two sets of countries.

Results

Global mortality and leading causes of death in 2013

In 2013, there were 7.7 (95% UI: 7.4-8.1) million deaths among children and adolescents globally, of which 6.28 million occurred among younger children, 0.48 million among older Children, and 0.97 million among adolescents (Table 1a & b, eTable 1-4).

Among all children and adolescents, the leading causes of death were predominantly those common in younger children as shown in Figures 1a and b and Figure 2, because of the large share of deaths in children younger than five years. The leading causes of death among younger children globally in 2013 were lower respiratory infections (905,059 deaths, UI: 810,304 - 998,125), preterm birth complications (742,381 deaths, UI: 591,348 - 910,767), neonatal encephalopathy following birth trauma and asphyxia (643,765 deaths, UI: 515,010 - 760,486), malaria (586,844 deaths, UI: 451,969 - 756,864), and diarrheal diseases (519,666 deaths, UI: 438,795 - 593,675) (Table 1b, eTable 1, Figure 1b). These five causes accounted for 3.4 million deaths or 54% of all deaths among children younger than five years. Five other causes accounted for an additional 24% of deaths: congenital anomalies (495,319 deaths, UI: 424,788 - 590,319), neonatal sepsis (366,041 deaths, UI: 233,155 - 510,770), other neonatal disorders (276,231 deaths, UI: 219,603 - 350,681), protein-energy malnutrition (225,906 deaths, UI: 168,497 - 280,129) and meningitis (141,952 deaths, UI: 105,060 - 182,518) (Table 1b, eTable 1). The

leading cause of death among younger children in each country in 2013 is shown in a map (eFigure 2). Lower respiratory infections, malaria, and diarrhea were the prevailing leading causes of death in sub-Saharan African countries. Lower respiratory infections were also the leading cause for some countries in Asia. Neonatal encephalopathy was the most common cause of death in some South Asian countries. Preterm birth complications and congenital anomalies were the leading causes of death among countries in North America, Australasia, Europe, East Asia, and most countries in Latin America and the Caribbean.

Table 1a. Number of Deaths and Age-standardized Rates (per 100,000) for the Top 10 Global Causes of Death in the Largest 50 Countries by Child and Adolescent Population, Ages 0 to 19, Both Sexes, 2013

Table 1a. Number of Deaths and Age-standardized Rates (per 100,000) for the Top 10 Global Causes of Death in the Largest 50 Countries by Child and Adolescent Population, Ages 0 to 19, Both Sexes.											
Location	All Cause	Lower Respiratory Infections	Preterm Birth Complications	Malaria	Neonatal Encephalopathy	Diarrheal Diseases	Congenital Anomalies	Neonatal Sepsis	Other Neonatal	Protein-Energy Malnutrition	Road Injuries
Global	7,722,750 (307.4)	978,680 (38.9)	742,381 (29.3)	652,820 (26.1)	643,765 (25.4)	590,607 (23.5)	533,165 (21.1)	366,041 (14.4)	276,231 (10.9)	245,899 (9.8)	220,064 (8.9)
Developing	7,586,066 (339.6)	972,977 (43.4)	726,053 (32.0)	652,820 (29.3)	637,629 (28.1)	589,834 (26.4)	508,095 (22.6)	363,566 (16.1)	268,355 (11.9)	245,744 (11.0)	205,864 (9.4)
Developed	136,684 (48.3)	5,703 (2.0)	16,328 (6.0)	0 (0.0)	6,136 (2.3)	772 (0.3)	25,070 (9.1)	2,476 (0.9)	7,876 (2.9)	156 (0.1)	14,200 (4.7)
Afghanistan	115,094 (622.9)	24,525 (131.4)	13,420 (71.1)	905 (5.0)	4,098 (21.7)	12,344 (66.2)	13,050 (69.7)	1,010 (5.4)	6,295 (33.4)	934 (5.0)	3,624 (20.9)
Algeria	166,217 (27.2)	1,178 (7.2)	6,617 (38.0)	3 (0.0)	1,945 (11.2)	673 (4.0)	4,746 (27.7)	1,671 (9.6)	1,180 (6.8)	364 (2.2)	1,535 (10.5)
Angola	95,184 (603.1)	14,534 (88.9)	4,991 (28.9)	9,632 (60.2)	4,577 (26.6)	10,733 (66.9)	6,578 (39.5)	2,563 (14.9)	3,071 (17.8)	5,510 (34.1)	2,605 (19.5)
Argentina	13,944 (106.2)	799 (6.1)	2,245 (17.6)	0 (0.0)	483 (3.8)	167 (1.3)	2,714 (21.1)	658 (5.2)	523 (4.1)	141 (1.1)	914 (6.6)
Bangladesh	162,876 (27.2)	15,631 (33.4)	19,077 (27.1)	10 (0.0)	28,412 (49.7)	2,200 (3.7)	8,703 (15.0)	13,856 (24.3)	6,537 (11.5)	3,275 (5.6)	1,950 (3.0)
Brazil	80,486 (135.6)	5,163 (9.0)	11,257 (20.5)	19 (0.0)	5,364 (9.8)	2,028 (3.6)	11,897 (21.3)	5,730 (10.4)	3,790 (6.9)	1,020 (1.8)	5,808 (8.6)
Cameroon	95,403 (683.9)	14,765 (102.9)	6,130 (40.8)	16,138 (116.4)	5,709 (38.0)	7,651 (54.2)	5,650 (38.9)	5,079 (33.8)	1,605 (10.7)	4,682 (33.5)	2,638 (21.8)
China	336,465 (97.8)	27,874 (8.1)	37,467 (11.0)	33 (0.0)	29,759 (8.7)	2,845 (0.8)	55,076 (16.1)	3,675 (1.1)	9,229 (2.7)	1,211 (0.4)	30,332 (8.6)
Colombia	24,375 (141.1)	1,951 (11.5)	2,341 (7.0)	19 (0.1)	1,166 (11.5)	820 (4.8)	3,807 (22.6)	778 (4.7)	767 (4.6)	713 (4.2)	1,433 (8.0)
Cote d'Ivoire	81,205 (653.3)	13,633 (106.5)	6,858 (51.0)	13,385 (106.5)	5,778 (42.9)	6,635 (52.8)	4,591 (35.4)	4,614 (34.4)	1,616 (12.1)	3,809 (30.9)	1,569 (14.8)
Democratic Republic of the Congo	387,210 (822.7)	61,499 (126.1)	26,984 (51.7)	37,453 (79.8)	16,564 (31.8)	62,988 (132.7)	20,396 (41.1)	9,836 (18.9)	9,710 (18.7)	34,389 (72.4)	4,246 (10.9)
Egypt	53,993 (157.5)	7,977 (22.9)	5,787 (16.6)	3 (0.0)	581 (1.7)	3,390 (9.7)	13,272 (38.2)	1,042 (3.0)	1,545 (4.4)	185 (0.5)	2,144 (6.5)
Ethiopia	273,571 (503.9)	40,963 (74.5)	20,328 (36.0)	16,642 (30.8)	17,243 (30.5)	25,585 (47.2)	12,461 (22.5)	16,090 (28.6)	10,072 (17.9)	10,482 (19.4)	4,933 (9.7)
France	4,789 (31.9)	70 (0.5)	335 (2.3)	0 (0.0)	318 (2.2)	38 (0.3)	831 (5.6)	111 (0.8)	288 (2.0)	2 (0.0)	589 (3.8)
Germany	4,187 (30.0)	63 (0.4)	658 (5.1)	0 (0.0)	202 (1.6)	17 (0.1)	858 (6.5)	60 (0.5)	133 (1.0)	1 (0.0)	456 (2.9)
Ghana	66,531 (479.5)	6,628 (47.1)	6,086 (42.0)	11,890 (85.8)	4,806 (33.1)	2,433 (17.4)	3,422 (24.1)	5,561 (45.3)	1,521 (10.5)	5,239 (37.6)	1,464 (11.5)
India	1,640,176 (348.8)	178,266 (38.2)	211,108 (45.4)	25,652 (5.4)	212,686 (45.7)	109,366 (23.3)	76,898 (16.5)	94,299 (20.3)	91,118 (19.6)	24,163 (5.2)	27,072 (5.6)
Indonesia	192,905 (218.4)	29,910 (34.2)	19,396 (22.6)	555 (0.6)	25,303 (29.5)	11,377 (12.8)	13,789 (15.8)	7,381 (8.6)	7,646 (8.9)	1,817 (2.0)	9,081 (9.8)
Iran	34,199 (130.8)	1,850 (7.0)	8,148 (30.5)	6 (0.0)	1,357 (5.1)	679 (2.6)	7,950 (1.2)	327 (1.2)	2,101 (7.9)	75 (0.3)	2,219 (8.9)
Iraq	36,974 (200.0)	3,172 (16.9)	7,416 (38.6)	0 (0.0)	1,063 (5.5)	1,682 (8.9)	6,431 (33.9)	1,727 (9.0)	1,310 (6.8)	141 (0.8)	1,204 (7.0)
Italy	3,440 (31.2)	54 (0.5)	537 (5.2)	0 (0.0)	183 (1.8)	9 (0.1)	668 (6.3)	70 (0.7)	209 (2.0)	2 (0.0)	468 (3.8)

Japan	5,498 (25.9)	253 (1.2)	292 (1.5)	0 (0.0)	131 (0.7)	31 (0.2)	1,249 (6.2)	91 (0.5)	200 (1.0)	5 (0.0)	461 (2.0)
Kenya	105,250 (393.6)	18,068 (65.4)	8,380 (29.7)	6,416 (23.8)	7,065 (25.0)	13,011 (47.8)	6,396 (23.0)	6,363 (22.5)	2,110 (7.5)	5,393 (19.8)	1,280 (5.3)
Madagascar	54,762 (402.5)	7,544 (54.4)	5,011 (34.7)	2,693 (20.6)	1,655 (11.5)	7,075 (51.8)	2,497 (17.7)	2,823 (19.6)	2,479 (17.2)	3,803 (28.2)	660 (5.6)
Malaysia	6,067 (58.8)	345 (3.4)	401 (4.2)	2 (0.0)	214 (4.2)	49 (0.5)	1,038 (10.7)	211 (2.2)	244 (2.5)	4 (0.0)	849 (7.5)
Mexico	54,288 (124.4)	4,624 (10.9)	6,280 (15.2)	0 (0.0)	2,850 (6.9)	1,588 (3.7)	10,674 (25.3)	2,975 (7.2)	1,449 (3.5)	1,003 (2.3)	3,735 (7.9)
Morocco	23,976 (180.9)	1,364 (10.3)	5,299 (38.7)	2 (0.0)	2,590 (18.9)	364 (2.7)	2,451 (18.3)	1,789 (13.1)	495 (3.6)	108 (0.8)	1,051 (8.4)
Mozambique	105,323 (624.1)	9,586 (54.9)	4,704 (25.8)	24,578 (145.3)	5,458 (29.9)	5,474 (32.1)	3,596 (20.3)	5,937 (32.6)	3,513 (19.3)	2,706 (15.9)	1,227 (8.6)
Myanmar	44,632 (258.9)	9,227 (54.5)	5,175 (30.9)	2,243 (12.4)	4,685 (28.0)	1,882 (11.0)	3,927 (23.1)	1,980 (6.2)	1,047 (5.4)	170 (1.0)	1,026 (5.4)
Nepal	28,664 (255.5)	4,598 (42.2)	2,536 (23.9)	148 (1.2)	4,123 (38.8)	2,269 (20.2)	1,126 (10.2)	2,349 (22.1)	1,354 (12.7)	416 (3.7)	425 (3.3)
Niger	109,268 (788.9)	15,722 (109.7)	5,545 (34.6)	24,007 (173.7)	4,375 (27.4)	18,851 (136.0)	3,808 (25.8)	3,507 (21.8)	2,081 (13.1)	7,241 (52.8)	1,217 (11.5)
Nigeria	997,325 (856.7)	118,643 (98.6)	61,669 (47.6)	246,283 (213.1)	60,479 (46.7)	47,410 (40.4)	40,960 (33.3)	45,349 (35.1)	18,926 (14.7)	45,785 (39.8)	34,466 (34.2)
Pakistan	416,805 (505.1)	64,527 (78.5)	36,320 (43.6)	1,461 (1.8)	64,388 (77.2)	52,326 (63.9)	17,408 (21.1)	34,161 (41.2)	12,441 (9.0)	4,297 (5.3)	7,434 (9.0)
Peru	16,931 (150.6)	2,399 (21.4)	1,879 (17.1)	2 (0.0)	1,463 (13.3)	382 (3.4)	1,974 (17.8)	1,276 (2.2)	243 (11.6)	323 (2.9)	856 (7.4)
Philippines	86,334 (196.7)	12,350 (28.1)	10,566 (11.6)	51 (0.1)	5,117 (11.6)	3,745 (8.5)	10,053 (22.9)	4,078 (9.3)	3,378 (7.7)	1,225 (2.8)	1,898 (4.4)
Russia	24,697 (83.4)	1,904 (6.2)	1,837 (5.9)	0 (0.0)	993 (3.2)	208 (0.7)	4,508 (14.6)	473 (1.5)	2,326 (7.5)	68 (0.2)	1,852 (6.7)
Saudi Arabia	9,198 (89.0)	200 (1.9)	1,906 (18.4)	2 (0.0)	397 (3.8)	92 (0.9)	2,402 (22.9)	715 (5.9)	208 (2.0)	14 (0.1)	992 (10.0)
South Africa	58,342 (288.2)	6,613 (32.6)	4,371 (21.7)	35 (0.2)	3,251 (16.1)	6,908 (34.0)	2,312 (11.4)	1,772 (8.8)	5,112 (25.3)	1,390 (6.8)	1,274 (6.3)
South Korea	3,210 (31.9)	77 (0.8)	371 (4.3)	0 (0.0)	90 (1.0)	9 (0.1)	439 (4.9)	74 (0.9)	145 (1.7)	1 (0.0)	410 (3.5)
Sudan	70,379 (316.1)	6,750 (30.0)	15,800 (67.9)	4,202 (19.0)	1,628 (7.0)	7,607 (33.5)	10,076 (44.0)	643 (2.8)	2,559 (11.0)	261 (1.2)	1,512 (7.7)
Tanzania	167,958 (517.4)	26,533 (79.1)	8,086 (23.1)	24,870 (76.2)	8,948 (25.5)	11,371 (35.0)	9,743 (28.6)	8,409 (24.0)	6,085 (17.4)	8,386 (25.4)	1,910 (6.6)
Thailand	15,783 (104.2)	1,029 (7.2)	1,669 (13.2)	14 (0.1)	666 (5.3)	156 (1.1)	2,023 (15.4)	579 (4.6)	297 (2.4)	4 (0.0)	2,338 (12.9)
Turkey	30,251 (125.7)	1,698 (6.8)	4,785 (20.7)	0 (0.0)	1,345 (5.8)	290 (1.2)	7,402 (31.6)	1,214 (5.2)	2,185 (9.4)	65 (0.3)	1,637 (6.3)
Uganda	147,277 (545.7)	16,561 (59.9)	10,836 (36.8)	25,022 (93.1)	10,733 (36.4)	9,608 (35.1)	6,433 (22.7)	8,504 (15.0)	4,409 (29.2)	7,606 (27.8)	3,136 (13.7)
United Kingdom	5,498 (37.6)	194 (1.3)	1,164 (8.2)	0 (0.0)	243 (1.7)	55 (0.4)	1,082 (7.5)	77 (0.5)	114 (0.8)	2 (0.0)	390 (2.5)
United States	27,850 (55.4)	9,908 (1.0)	1,673 (8.8)	0 (0.0)	4,454 (2.1)	396 (0.2)	2,248 (8.9)	298 (1.0)	955 (3.1)	6 (0.0)	675 (6.8)
Uzbekistan	13,132 (244.5)	876 (87.2)	1,418 (14.7)	4 (0.0)	566 (39.2)	454 (3.5)	1,859 (19.8)	733 (2.6)	192 (8.4)	235 (0.1)	1,096 (5.9)
Venezuela	116,414 (116.4)	7,781 (7.8)	12,919 (12.9)	0 (0.0)	5,511 (5.1)	4,441 (4.4)	16,717 (16.7)	6,616 (6.6)	1,171 (1.7)	12,111 (12.1)	9,511 (9.5)

Vietnam	36,163 (132.1)	5,591 (20.8)	5,522 (21.1)	73 (0.3)	2,270 (8.7)	279 (1.0)	4,862 (18.2)	1,053 (4.0)	515 (2.0)	9 (0.0)	3,063 (10.0)
Yemen	46,088 (342.3)	4,377 (32.5)	9,343 (67.7)	3,554 (26.9)	1,391 (10.1)	5,500 (40.7)	6,191 (45.4)	345 (2.5)	2,237 (16.2)	153 (1.1)	1,650 (12.9)

Table 1b. Number of Deaths and Rates (per 100,000) for the Top 10 Global Causes of Death in the Largest 50 Countries by Child and Adolescent Population, Under 5, Both Sexes, 2013

Table 1b. Number of Deaths and Rates (per 100,000) for the Top 10 Global Causes of Death in the Largest 50 Countries by Child and Adolescent Population, Under-5, Both Sexes, 2013												
Location	All Cause	Lower Respiratory Infections	Neonatal Preterm Birth	Neonatal Encephalopathy	Malaria	Diarrheal Diseases	Congenital Anomalies	Neonatal Sepsis	Other Neonatal	Protein-Energy Malnutrition	Meningitis	
Global	6,279,920 (951.5)	905,059 (137.1)	742,381 (112.5)	643,765 (97.5)	586,844 (88.9)	519,666 (78.7)	495,319 (75.1)	366,041 (55.5)	276,231 (41.9)	225,906 (34.2)	141,952 (21.5)	
Developing	6,193,574 (1,055.7)	900,384 (153.8)	726,053 (123.8)	637,629 (108.7)	586,844 (100.0)	518,963 (88.5)	472,671 (80.6)	363,566 (62.0)	268,355 (45.7)	225,796 (38.5)	140,814 (24.0)	
Developed	86,346 (117.8)	4,675 (6.4)	16,328 (22.3)	6,136 (8.4)	0 (0.0)	703 (8.4)	22,648 (30.9)	2,476 (3.4)	7,876 (10.7)	110 (0.2)	1,138 (1.6)	
Afghanistan	94,721 (1,919.6)	22,657 (459.2)	13,420 (83.1)	4,098 (8.1)	436 (8.8)	11,916 (241.5)	12,203 (247.3)	1,010 (20.5)	6,295 (127.6)	761 (15.4)	4,721 (95.7)	
Algeria	514.7 (83.3)	21.9 (97.6)	148.4 (6.1)	43.6 (1.9)	0 (0.0)	14.2 (14.2)	102.2 (102.2)	37.5 (37.5)	1.180 (26.5)	340 (7.6)	331 (7.4)	
Angola	83,369 (1,950.1)	13,668 (319.7)	4,991 (116.7)	4,577 (107.1)	8,987 (210.2)	9,722 (227.4)	6,307 (147.5)	2,563 (59.9)	3,071 (71.8)	5,229 (122.3)	2,659 (62.2)	
Argentina	9,828 (287.0)	644 (18.8)	2,245 (65.6)	483 (14.1)	0 (0.0)	155 (4.5)	2,545 (74.3)	658 (19.2)	523 (15.3)	120 (3.5)	143 (4.2)	
Bangladesh	128,228 (843.5)	14,800 (97.3)	19,077 (125.5)	28,412 (186.9)	4 (0.0)	1,718 (11.3)	7,457 (49.1)	13,856 (91.1)	6,537 (43.0)	2,806 (18.5)	1,257 (8.3)	
Brazil	54,076 (362.0)	4,255 (28.5)	11,257 (75.4)	5,364 (35.9)	9 (0.1)	1,919 (12.8)	11,246 (75.3)	5,730 (38.4)	3,790 (25.4)	919 (6.2)	816 (5.5)	
Cameroon	82,515 (2,234.5)	13,981 (378.6)	6,130 (166.0)	5,709 (154.6)	14,638 (396.4)	7,160 (193.9)	5,411 (146.5)	7,160 (137.5)	1,605 (43.5)	4,376 (118.5)	2,675 (72.4)	
China	239,013 (265.1)	26,095 (28.9)	37,467 (41.5)	29,759 (33.0)	11 (0.0)	2,626 (2.9)	50,853 (56.4)	3,675 (4.1)	9,229 (10.2)	1,088 (1.2)	2,789 (3.1)	
Colombia	16,332 (362.7)	1,739 (38.6)	2,341 (52.0)	1,166 (25.9)	11 (0.2)	781 (17.3)	3,595 (79.8)	778 (17.3)	767 (14.5)	655 (17.0)	314 (7.0)	
Cote d'Ivoire	70,182 (2,162.0)	12,977 (399.8)	6,858 (211.3)	5,778 (178.0)	12,022 (370.4)	6,199 (191.0)	4,394 (135.4)	4,614 (142.1)	1,616 (49.8)	3,527 (108.6)	2,402 (74.0)	
Democratic Republic of the Congo	340,416 (2,736.6)	58,309 (468.7)	26,984 (216.9)	15,564 (133.2)	34,629 (278.4)	57,183 (459.7)	19,520 (156.9)	9,836 (79.1)	9,710 (78.1)	32,916 (264.6)	8,985 (72.2)	
Egypt	41,267 (447.6)	7,371 (79.9)	5,787 (62.8)	581 (6.3)	1 (0.0)	3,273 (35.5)	12,306 (133.5)	1,042 (11.3)	1,545 (16.8)	173 (1.9)	164 (1.8)	
Ethiopia	229,333 (1,615.1)	38,427 (270.6)	20,328 (143.2)	17,243 (121.4)	15,276 (107.6)	22,209 (156.4)	11,763 (82.8)	16,090 (113.3)	10,072 (70.9)	9,603 (67.6)	7,397 (52.1)	
France	2,967 (75.3)	50 (1.3)	335 (8.5)	318 (8.1)	0 (0.0)	34 (0.9)	744 (18.9)	111 (2.8)	288 (7.3)	1 (0.0)	31 (0.8)	
Germany	2,539 (73.1)	38 (1.1)	658 (18.9)	202 (5.8)	0 (0.0)	12 (0.4)	743 (21.4)	60 (1.7)	133 (3.8)	1 (0.0)	24 (0.7)	
Ghana	56,588 (1,537.9)	6,090 (165.5)	6,086 (165.4)	4,806 (130.6)	10,737 (291.8)	2,245 (61.0)	3,219 (87.5)	6,561 (178.3)	1,521 (41.3)	4,888 (132.8)	1,284 (34.9)	
India	1,249,673 (1,022.1)	154,884 (126.7)	211,108 (172.7)	212,686 (174.0)	9,453 (7.7)	80,225 (65.6)	69,283 (56.7)	94,299 (77.1)	91,118 (74.5)	19,483 (15.9)	8,659 (7.1)	
Indonesia	148,807 (639.9)	28,186 (121.2)	19,396 (83.4)	25,303 (108.8)	129 (0.6)	8,700 (37.4)	12,240 (52.6)	7,381 (31.7)	7,646 (32.9)	1,424 (6.1)	4,968 (21.4)	
Iran	27,378 (390.5)	1,645 (23.5)	8,148 (116.2)	1,357 (23.5)	4 (0.1)	647 (9.2)	7,462 (106.4)	327 (4.7)	2,101 (30.0)	70 (1.0)	208 (3.0)	
Iraq	29,942 (607.8)	2,900 (58.9)	7,416 (150.5)	1,063 (21.6)	0 (0.0)	1,599 (32.5)	6,018 (122.2)	1,727 (35.1)	1,310 (26.6)	127 (2.6)	673 (13.7)	
Italy	2,060 (73.2)	37 (1.3)	537 (19.1)	183 (6.5)	0 (0.0)	8 (0.3)	591 (21.0)	70 (2.5)	209 (7.4)	1 (0.0)	14 (0.5)	

Japan	3,158 (58.5)	168 (3.1)	292 (5.4)	131 (2.4)	0 (0.0)	27 (0.5)	1,137 (21.1)	91 (1.7)	200 (3.7)	3 (0.1)	29 (0.5)
Kenya	89,504 (1,244.0)	17,324 (240.8)	8,380 (116.5)	7,065 (98.2)	5,743 (79.8)	11,925 (85.4)	6,146 (85.4)	6,363 (88.4)	2,110 (29.3)	5,062 (70.4)	3,160 (43.9)
Madagascar	45,736 (1,278.3)	6,885 (192.4)	5,011 (140.1)	1,655 (46.3)	1,767 (49.4)	6,345 (177.3)	2,352 (65.8)	2,823 (78.9)	2,479 (69.3)	3,367 (94.1)	1,169 (32.7)
Malaysia	3,349 (133.8)	218 (8.7)	401 (16.0)	214 (8.5)	1 (0.0)	39 (1.5)	951 (38.0)	211 (8.4)	244 (9.8)	3 (0.1)	72 (2.9)
Mexico	38,097 (336.9)	4,249 (37.6)	6,280 (55.5)	2,850 (25.2)	0 (0.0)	1,419 (12.6)	9,837 (87.0)	2,975 (26.3)	1,449 (12.8)	832 (7.4)	247 (2.2)
Morocco	19,441 (567.5)	1,211 (35.3)	5,299 (154.7)	2,590 (75.6)	0 (0.0)	325 (9.5)	2,316 (67.6)	1,789 (52.2)	495 (14.5)	100 (2.9)	326 (9.5)
Mozambique	87,913 (1,940.5)	9,010 (198.9)	4,704 (103.8)	5,458 (120.5)	21,497 (474.5)	4,870 (107.5)	3,431 (75.7)	5,937 (131.0)	3,513 (77.5)	2,480 (54.7)	2,008 (44.3)
Myanmar	34,098 (760.9)	8,691 (193.9)	5,175 (115.5)	4,685 (104.6)	721 (16.1)	1,611 (36.0)	3,459 (77.2)	1,980 (44.2)	1,047 (23.4)	157 (3.5)	560 (12.5)
Nepal	22,241 (754.6)	4,384 (148.7)	2,536 (86.0)	4,123 (139.9)	63 (2.1)	1,897 (64.4)	972 (33.0)	2,349 (79.7)	1,354 (45.9)	323 (11.0)	206 (7.0)
Niger	97,824 (2,669.4)	14,845 (405.1)	5,545 (151.3)	4,375 (119.4)	22,819 (622.7)	17,426 (475.5)	3,579 (97.7)	3,507 (95.7)	2,081 (56.8)	6,799 (185.5)	3,560 (97.2)
Nigeria	892,598 (2,930.4)	113,255 (371.8)	61,669 (202.5)	60,479 (198.6)	235,483 (773.1)	44,743 (146.9)	39,396 (129.3)	45,349 (148.9)	18,926 (62.1)	43,299 (142.2)	18,872 (62.0)
Pakistan	348,496 (1,619.4)	61,569 (286.6)	36,320 (168.8)	64,388 (299.2)	367 (1.7)	48,321 (224.5)	15,729 (73.1)	34,161 (158.7)	12,441 (57.8)	3,367 (15.6)	17,091 (79.4)
Peru	13,209 (446.9)	2,041 (69.1)	1,879 (63.6)	1,463 (49.5)	1 (0.0)	349 (11.8)	1,864 (63.1)	1,276 (43.2)	243 (8.2)	281 (9.5)	149 (5.0)
Philippines	65,074 (564.6)	10,432 (90.5)	10,566 (91.7)	5,117 (44.4)	16 (0.1)	3,287 (28.5)	9,014 (78.2)	4,078 (35.4)	3,378 (29.3)	1,002 (8.7)	1,438 (12.5)
Russia	16,255 (196.2)	1,656 (20.0)	1,837 (22.2)	993 (12.0)	0 (0.0)	203 (2.4)	4,119 (49.7)	473 (5.7)	2,326 (28.1)	47 (0.6)	353 (4.3)
Saudi Arabia	6,775 (241.3)	121 (4.3)	1,906 (67.9)	397 (14.2)	1 (0.0)	81 (2.9)	2,194 (78.1)	715 (25.5)	208 (7.4)	10 (0.4)	17 (0.6)
South Africa	40,647 (758.0)	6,061 (113.0)	4,371 (81.5)	3,251 (60.6)	21 (0.4)	6,510 (121.4)	2,201 (41.0)	1,772 (33.0)	5,112 (95.3)	1,352 (25.2)	574 (10.7)
South Korea	1,764 (76.0)	55 (2.4)	371 (16.0)	90 (3.9)	0 (0.0)	7 (0.3)	397 (17.1)	74 (3.2)	145 (6.2)	0 (0.0)	10 (0.4)
Sudan	59,503 (993.6)	6,046 (101.0)	15,800 (263.8)	1,628 (27.2)	3,446 (57.5)	7,173 (119.8)	9,553 (159.5)	643 (10.7)	2,559 (42.7)	237 (4.0)	1,007 (16.8)
Tanzania	145,246 (1,680.0)	25,290 (292.5)	8,086 (93.5)	8,948 (103.5)	22,604 (261.5)	9,951 (115.1)	9,411 (108.9)	8,409 (97.3)	6,085 (70.4)	7,967 (92.1)	3,593 (41.6)
Thailand	7,675 (213.8)	680 (18.9)	1,669 (46.5)	666 (18.5)	5 (0.1)	113 (3.1)	1,823 (50.8)	297 (16.1)	579 (8.3)	2 (0.1)	83 (2.3)
Turkey	22,002 (350.5)	1,273 (20.3)	4,785 (76.2)	1,345 (21.4)	0 (0.0)	253 (4.0)	7,014 (111.7)	1,214 (34.8)	2,185 (19.3)	43 (0.7)	210 (3.3)
Uganda	127,340 (1,773.3)	15,339 (213.6)	10,838 (150.9)	10,733 (149.5)	22,449 (312.6)	8,776 (122.2)	6,153 (85.7)	8,604 (119.8)	4,409 (61.4)	7,176 (99.9)	4,906 (68.3)
United Kingdom	3,785 (98.9)	158 (4.1)	1,164 (30.4)	243 (6.3)	0 (0.0)	50 (1.3)	969 (25.3)	77 (2.0)	114 (3.0)	1 (0.0)	56 (1.5)
United States	28,013 (133.1)	627 (3.0)	6,822 (32.4)	1,650 (7.8)	0 (0.0)	150 (0.7)	6,350 (30.2)	806 (3.8)	2,399 (11.4)	14 (0.1)	238 (1.1)
Uzbekistan	22,318 (742.7)	9,217 (306.8)	1,673 (55.7)	4,454 (148.2)	0 (0.0)	376 (12.5)	2,121 (70.6)	298 (9.9)	955 (31.8)	4 (0.1)	214 (7.1)
Venezuela	7,973 (268.9)	763 (25.7)	1,418 (47.8)	566 (19.1)	2 (0.1)	465 (15.7)	1,675 (56.5)	733 (24.7)	192 (6.5)	210 (7.1)	117 (4.0)

Vietnam	26,628	5,321	5,522	2,270	23	222	4,411	1,053	515	6	230
	(370.8)	(74.1)	(76.9)	(31.6)	(0.3)	(3.1)	(61.4)	(14.7)	(7.2)	(0.1)	(3.2)
Yemen	38,030	3,879	9,343	1,391	2,645	5,177	5,883	345	2,237	138	708
	(1,083.1)	(110.5)	(266.1)	(39.6)	(75.3)	(147.4)	(167.5)	(9.8)	(63.7)	(3.9)	(20.2)

Figure 1a. Top 25 Global Causes of Death for the Largest 50 Countries by Child and Adolescent Population, Both Sexes, Ages 0 to 19, 2013

Figure 1a. Top 25 Global Causes of Death for the Largest 50 Countries by Child and Adolescent Population, Both Sexes, Ages 0 to 19, 2013																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
Location	Lower Respiratory Infections		Preterm Birth Complications		Malaria		Neonatal Encephalopathy		Diarrheal Diseases		Congenital Anomalies		Neonatal Sepsis		Other Neonatal		Protein-Energy Malnutrition		Road Injuries		Meningitis		HIV/AIDS		Drowning		Hemoglobinopathies		Intestinal Infections		STDs		Measles		Tuberculosis		Whooping Cough		Self-Harm		Mechanical Forces		Fire & Heat		Foreign Body		Interpersonal Violence		Other Neoplasms																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
Global	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												

France	16	3	-	5	22	1	11	6	67	2	23	61	13	37	29	46	96	65	56	7	19	25	15	17	8
Germany	14	2	-	5	29	1	15	8	78	3	21	88	13	34	45	39	69	87	75	4	19	25	18	17	7
Italy	13	2	-	5	38	1	12	4	71	3	25	46	14	24	17	22	120	68	72	11	19	32	15	20	6
Japan	6	4	-	11	31	1	15	8	55	3	27	116	7	23	28	29	97	63	62	2	19	21	12	14	5
Russia	3	5	-	8	23	1	13	2	35	4	15	36	6	54	33	50	121	40	67	7	22	12	11	10	19
South Korea	11	3	128	9	38	1	12	5	77	2	31	97	6	28	29	30	107	34	69	4	20	23	16	15	8
United Kingdom	6	1	-	5	21	2	15	12	77	3	16	104	20	35	28	49	116	69	57	11	17	25	18	23	7
United States	13	2	-	8	29	1	14	5	64	3	23	55	9	33	41	43	127	84	60	7	10	17	21	6	11

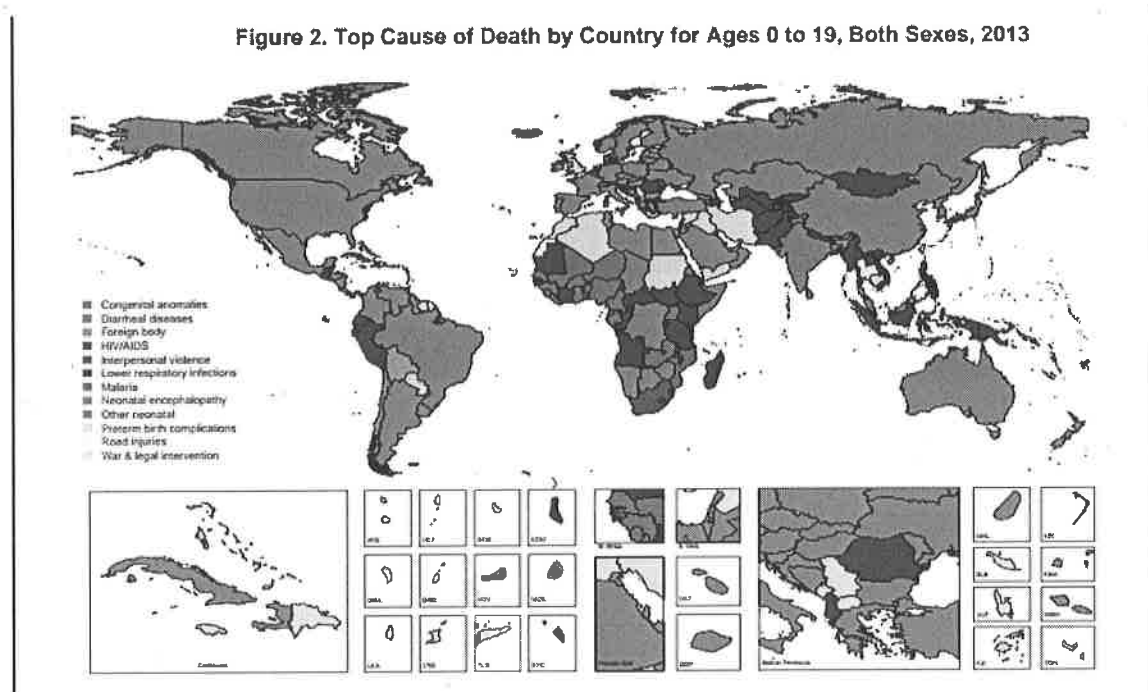
Footnote (Figure 1a): Colors correspond to the ranking of the leading causes of death, with dark red as the most common cause and dark green as the least common cause for the location indicated. The numbers inside each box indicate the ranking.

Figure 1b. Top 25 Global Causes of Death for the Largest 50 Countries by Child and Adolescent Population, Under 5, Both Sexes, 2013

Location	Lower Respiratory Infections	Preterm Birth Complications	Neonatal Encephalopathy	Malaria	Diarrheal Diseases	Congenital Anomalies	Neonatal Sepsis	Other Neonatal	Protein-Energy Malnutrition	Meningitis	STDs	Hemoglobinopathies	Measles	Drowning	Road Injuries	HIV/AIDS	Intestinal Infections	Whooping Cough	Foreign Body	Tuberculosis	Mechanical Forces	Other Infectious	Fire & Heat	Iron Deficiency Anemia	Tetanus
Global	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Developing	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	21	25	23	24
Afghanistan	1	2	7	21	4	3	13	5	16	6	35	18	10	9	14	75	20	8	34	17	26	24	22	19	12
Algeria	6	1	3	84	8	2	4	5	9	11	15	24	12	21	7	80	13	46	45	47	39	41	22	31	58
Angola	1	6	7	3	2	4	10	8	5	9	11	14	28	16	15	12	24	20	19	18	23	22	17	13	49
Argentina	4	2	6	91	9	1	3	5	13	11	19	17	88	12	10	46	48	25	7	45	33	35	18	54	76
Bangladesh	3	2	1	79	11	6	4	7	10	14	8	19	16	5	25	64	9	15	18	52	23	24	37	34	60
Brazil	5	1	4	65	7	2	3	6	9	10	12	32	80	13	11	59	15	45	8	49	31	27	25	34	64
Cameroon	2	4	5	1	3	6	7	11	8	9	10	15	13	17	14	12	19	18	20	27	25	24	22	16	41
China	4	2	3	83	15	1	9	7	24	13	36	25	68	5	8	39	38	47	12	53	6	44	27	51	43
Colombia	3	2	4	60	5	1	6	7	8	12	17	39	91	10	11	72	18	46	9	50	27	32	23	43	61
Cote d'Ivoire	1	3	5	2	4	7	6	10	8	9	16	12	11	18	13	17	20	14	24	21	25	26	22	15	19
Democratic Republic of the Congo	1	5	7	3	2	6	8	9	4	10	12	11	15	13	20	18	22	23	26	16	25	19	17	14	44
Egypt	2	3	12	87	4	1	8	5	21	22	52	13	29	14	10	64	11	43	44	71	45	18	40	35	57
Ethiopia	1	3	4	6	2	9	5	10	11	13	12	23	8	19	18	14	17	7	30	15	22	25	21	16	20
Ghana	3	4	6	1	9	7	2	10	5	11	17	8	12	16	13	18	15	34	22	31	23	37	28	14	21
India	3	2	1	21	6	7	4	5	10	22	9	33	24	15	29	48	8	19	12	13	25	11	27	28	14
Indonesia	1	3	2	45	5	4	7	6	15	9	13	23	8	11	14	26	12	10	16	38	43	24	22	36	25
Iran	4	1	5	67	7	2	13	3	31	15	42	19	16	8	6	89	11	50	14	51	17	32	10	40	65
Iraq	3	1	7		5	2	4	6	31	9	61	26	27	14	10	57	19	8	49	36	32	28	18	41	77
Kenya	1	3	4	7	2	6	5	12	8	9	13	18	11	19	17	10	14	16	30	15	24	25	20	21	29
Madagascar	1	3	11	10	2	9	6	8	5	12	4	22	7	20	21	18	17	19	38	25	28	14	24	13	33
Malaysia	4	2	5	69	15	1	6	3	53	10	14	21	9	12	11	47	8	27	7	46	39	22	33	58	70
Mexico	3	2	5	91	7	1	4	6	9	19	22	41	90	14	10	69	13	51	8	55	35	36	32	39	75
Morocco	5	1	2	86	11	3	4	7	22	10	6	32	18	9	8	67	13	57	48	34	21	36	27	28	60
Mozambique	3	7	5	1	6	10	4	9	11	12	8	22	13	24	16	2	19	15	31	18	25	26	17	20	21
Myanmar	1	2	3	10	6	4	5	7	21	11	9	24	8	12	33	39	13	14	23	52	34	26	18	31	48
Nepal	1	3	2	27	5	7	4	6	10	13	8	26	34	11	25	50	12	15	23	18	28	17	16	40	14
Niger	3	5	6	1	2	7	9	10	4	8	11	12	18	15	19	29	21	16	27	17	22	23	20	14	13
Nigeria	2	4	5	1	7	9	6	11	8	12	13	3	15	16	10	14	23	21	25	18	22	27	17	19	50
Pakistan	2	4	1	44	3	7	5	8	11	6	14	26	12	13	16	54	9	17	10	19	30	22	23	39	27
Peru	1	2	4	81	7	3	5	11	9	13	10	30	92	14	8	73	18	17	6	41	28	29	26	33	62
Philippines	2	1	4	69	7	3	5	6	13	11	21	34	8	12	20	35	9	15	14	27	46	41	37	25	39
Saudi Arabia	9	2	4	64	11	1	3	5	32	19	24	14	55	7	6	26	8	29	33	52	15	47	16	41	53
South Africa	2	4	5	54	1	7	8	3	9	12	10	33	23	18	15	6	19	13	16	14	24	22	21	48	72
Sudan	4	1	7	5	3	2	12	6	23	10	9	17	11	32	13	25	15	30	38	35	33	28	24	27	47
Tanzania	1	8	6	2	4	5	7	10	9	11	3	19	12	17	18	13	16	33	31	14	23	25	21	20	29
Thailand	3	2	4	56	10	1	5	7	63	11	12	22	19	6	9	41	8	50	13	66	36	16	33	55	59
Turkey	5	2	4	88	10	1	6	3	33	12	22	20	11	32	9	49	7	39	14	45	35	38	30	53	68
Uganda	2	3	4	1	5	8	6	12	7	10	9	20	13	19	14	11	17	16	23	15	18	22	21	29	25
Uzbekistan	1	4	2		7	3	8	5	52	12	32	19	83	6	15	74	36	66	14	47	9	18	10	31	82
Venezuela	3	2	5	68	6	1	4	10	9	12	7	27	92	13	11	71	15	19	8	53	23	33	24	54	72
Vietnam	2	1	5	45	13	3	6	8	63	12	15	21	7	4	14	46	9	22	10	59	24	30	32	70	48
Yemen	4	1	7	5	3	2	13	6	26	8	11	23	14	15	10	45	17	9	42	29	34	27	18	19	16
Developed	6	2	4	90	18	1	7	3	40	13	26	31	67	10	8	47	30	50	9	55	12	23	15	59	75

France	13	2	4	-	14	1	6	5	50	15	36	32	64	12	8	55	24	44	9	57	21	23	20	59	70
Germany	10	2	3	-	23	1	7	5	60	14	28	27	42	13	11	62	37	59	12	72	19	24	20	52	69
Italy	8	2	4	-	22	1	5	3	53	17	13	24	82	21	11	57	16	52	10	60	19	25	29	40	66
Japan	4	2	6	-	21	1	8	3	47	20	17	23	59	9	11	84	27	51	7	56	13	24	22	64	66
Russia	4	3	5	-	13	1	8	2	28	10	34	45	82	9	12	29	30	51	7	37	19	46	11	41	78
South Korea	8	2	4	87	26	1	7	3	60	24	21	28	65	11	6	82	27	55	9	38	15	30	23	64	57
United Kingdom	5	1	4	-	12	2	7	6	59	10	31	34	77	20	14	78	26	45	13	60	15	17	18	62	74
United States	9	1	5	-	22	2	6	4	55	18	32	28	86	10	7	56	39	46	12	66	8	19	14	60	75

Figure 2. Top cause of death by country for ages 0 to 19, both sexes, 2013



Footnote (Figure 2): “Foreign Body” refers to “foreign body in lung and pulmonary aspiration”. “Neonatal Encephalopathy” refers to “neonatal encephalopathy following birth trauma and asphyxia”.

Among older children, the most common cause of death in 2013 was diarrheal diseases (38,325 deaths, UI: 30,365 - 47,678), followed by lower respiratory infections (37,431 deaths, UI: 30,713 - 44,837), road injuries (36,577 deaths, UI: 31,097 - 41,896), intestinal infectious diseases (mainly typhoid and paratyphoid) (36,110 deaths, UI: 20,561 - 57,277), and malaria (35,212 deaths, UI: 26,187 - 46,691) (eTable 2, eFigure 3). These five causes accounted for 181 thousand deaths or 39% of deaths among 5-9 year old children. Five other causes accounted for an additional 23% of deaths: drowning (31,500 deaths, UI: 25,452 - 42,630), HIV/AIDS (28,211 deaths, UI: 26,407 - 30,307), hemoglobinopathies (20,229 deaths, UI: 6,077 - 42,394), congenital anomalies (17,508 deaths, UI: 14,677 - 20,722), and meningitis 13,577 deaths, UI: 10,777 - 16,863) (eTable 2). Country-specific leading causes of death among children aged 5-9 years are shown in eFigure 4. For countries in North America, Latin America and Caribbean, and Australasia, road injuries were the leading cause of death while drowning was the most common cause of death in most countries in Eastern Europe, East Asia and South East Asia. Intestinal infectious diseases and lower respiratory infections were the leading causes for countries in South Asia while diarrheal diseases, HIV/AIDS and malaria were the leading causes for countries in sub-Saharan Africa.

Among adolescents, the leading cause of death in 2013 was road injuries (115,186 deaths, UI: 105,185 - 124,870), followed by HIV/AIDS (75,564 deaths, UI: 69,254 - 82,629), self-harm (59,114 deaths, UI: 47,914 - 70,864), drowning (51,013 deaths, UI: 43,533 - 68,179), and intestinal infectious diseases (44,171 deaths, UI: 24,318 - 72,643) (eTable 3, eFigure 5). These five leading causes accounted for 34% of all deaths in this age group. Another five causes contributed an additional 17% of all deaths: interpersonal violence (38,300 deaths, UI: 27,452 -

45,009), lower respiratory infections (36,190 deaths, UI: 31,124 - 42,361), diarrhea (32,616 deaths, UI: 26,725 - 38,766), malaria (30,764 deaths, UI: 25,003 - 38,940), and tuberculosis (29,257 deaths, UI: 23,880 - 34,091) (eTable 3). Country-specific leading causes of death among adolescents in 2013 are shown in eFigure 6. Injury related deaths were the leading causes in most countries except for those in sub-Saharan Africa where HIV/AIDS was the dominant leading cause of death. Self-harm was the most common cause of death for some parts of Asia and Eastern Europe.

Contributions to global child and adolescent deaths according to population proportion

Table 1a shows the number of deaths and age-standardized mortality rates for the 10 leading causes among children and adolescents at the global level and in the 50 countries with the largest child and adolescent populations. In 2013, there were 2.5 billion children and adolescents in the world, and the 50 countries represented 73% of this population (eTable 5). In 2013, Nigeria had about 4% of the world's children and adolescents (eTable 5) but a 12% share of global lower respiratory infections deaths and a 38% share of global malaria deaths (Table 1a). India had nearly 20% of the world's child and adolescent population but 33% of the world's neonatal encephalopathy deaths. Half of world's diarrheal deaths among children and adolescents occurred in just five countries: India, Democratic Republic of the Congo, Pakistan, Nigeria, and Ethiopia which together represented 30% of the world's pediatric population in 2013 (Table 1a, eTable 5).

Mortality time trends

The global decline in mortality between 1990 and 2013 was faster among younger (annual percent change (APC), -3.0%) and older children (APC, -2.9%) than adolescents (APC, -1.6%) (eTables 6-8). The corresponding APC figures in developing countries were -3.1, -3.0, and -1.7% and those in developed countries were -3.5, -3.9, and -2.5% respectively (eTables 6-8).

Among children younger than five years, countries in which all-cause mortality declined rapidly experienced these large declines in most of the leading causes of death (eTable 6). For example, Oman, China and Maldives, the three countries with fastest declining under-five mortality rates, showed an annual reduction of 5.6% or greater in mortality from at least 6 of the 10 leading causes of death (eTable 6). Countries with the slowest declines (Vanuatu, Fiji, Swaziland, Lesotho, and Zimbabwe) showed either a stagnant or an increasing trend in most of the 10 leading causes (eTable 6). Similarly, among older children and adolescents, countries with a rapid decline in all-cause mortality experienced greater declines for most of the leading causes of death in these age groups (eTables 7-9).

Global YLDs and prevalence of the leading causes of disability

In 2013, disability caused 135.6 million YLDs among children and adolescents, of which 26.4 million affected children younger than five years, 29.6 million affected older children, and 79.6 million affected adolescents (data not shown in table).

Leading causes of YLD largely overlapped among the three age groups. Iron deficiency anemia was the most common cause of YLD in both younger and older children and adolescents in 2013 (Table 2, eTable 10-13). The 50 countries with the largest child and adolescent population contributed to 86% of global iron deficiency anemia cases in this population (Table 2). India

contributed the largest number of cases (147.9 million), followed by China (75.7 million) and Nigeria (24.7 million). The prevalence of iron-deficiency anemic children and adolescents was highest in Afghanistan (41%), followed by Yemen (39.8%) and Senegal (38.5%) (Table 2, eTable 13).

Skin diseases were the second leading cause of YLD among children and adolescents in 2013 (Table 2). Younger and older children were most commonly affected by viral skin diseases and dermatitis, whereas adolescents were mainly affected by acne vulgaris (data not shown in table). Depressive disorders were the third most common cause of YLD among children and adolescents, with the prevalence in adolescents being 4 times as high as that in older children (2.8% versus 0.7%) (Table 2, eTable 11 & 12).

Among other leading causes of YLD among children and adolescents, conduct disorder, anxiety disorders, low back and neck pain, and migraine mainly affected older children and adolescents, whereas sense organ diseases and hemoglobinopathies affected all three age groups (Table 2, eTable 10-12). Among sense organ diseases, uncorrected refractive error and hearing loss were the most frequently occurring causes in all three age groups (data not shown in table). The country-year-age-sex specific distributions of YLDs for each cause and their sub-categories are viewable in an interactive online visualization tool at <http://vizhub.healthdata.org/gbd-compare>.

DALYs among children and adolescents

Figure 3 shows DALY rates for leading causes among males and females aged 0-19 years at the global level and in the 50 countries with the largest child and adolescent populations. Age-group

specific leading causes of DALYs are shown in eFigures 7-9. The rankings of leading causes of deaths and DALYs are similar if the percent contribution to the disease burden by mortality is high, which is especially the case for the main conditions affecting younger children (Figure 1b and eFigure 7). Sex differences were small in younger children but larger in some of the causes among adolescents. For instance, transport injuries, drowning and interpersonal violence among adolescent boys were much higher than among adolescent girls (eFigure 9). The most striking sex differences were observed in Venezuela, Colombia and Brazil for interpersonal violence (eFigure 9). Maternal disorders were common causes of DALYs among adolescent girls in sub-Saharan African and South Asian countries (eFigure 9).

Time trends in DALYs

Among all children and adolescents, the leading causes of DALYs were dominated by those common in children younger than five years (Figure 4a & b), who had the greatest share of deaths. Lower respiratory infections remained the leading cause of DALYs among children younger than five years in both 1990 and 2013, but the number and rate of DALYs declined over the 23 years by 58% and 59% respectively (Figure 4b). Preterm birth complications and neonatal encephalopathy rose in rank (from 3rd and 4th to 2nd and 3rd respectively) because of their relatively slower rates of decline than diarrhea, which dropped from 2nd to 5th, with a 67% decrease in DALY rates (Figure 4b). The rate for measles also notably declined (from 8th to 14th), with an 84% decrease in DALY rates between 1990 and 2013 (Figure 4b).

Among older children and adolescents, iron deficiency anemia remained the leading cause of DALYs in both 1990 and 2013, with a modest decrease in the number and rate of DALYs over the 23 years (eFigure 10 & 11). The rank of HIV/AIDS increased from 101 to 6 among

adolescents, 78 to 10 among older children, and 33 to 17 among younger children between 1990 and 2013, with a statistically significant increase in both DALY counts and rates (Figure 4b, eFigure 10 & 11). Full details of the results by age, sex, geography, and time period can be viewed in the online interactive visualization tool (<http://vizhub.healthdata.org/gbd-compare>).

Figure 3. Age-standardized DALY rate (per 100,000), ages 0 to 19, 2013

Table 2. Number of Prevalent Cases and Age-standardized Rates (%) for the Largest 50 Countries by Child and Adolescent Population, Ages 0 to 19, Both Sexes, 2013 for the Top 10 Global Causes of YLDs in Children and Adolescents

Location	Iron Deficiency Anemia	Skin Diseases	Depressive Disorders	Low Back and Neck Pain	Conduct Disorder	Sense Organ Diseases	Diarrheal Diseases	Anxiety Disorders	Migraine	Hemoglobinopathies
Global	619,605,056 (25.1)	660,642,176 (26.8)	38,112,752 (1.5)	55,550,072 (2.2)	47,630,912 (1.9)	171,179,648 (6.9)	32,115,848 (1.3)	54,400,176 (2.2)	135,462,464 (5.5)	686,931,456 (27.8)
Developing	559,020,288 (25.6)	579,689,344 (26.7)	32,712,120 (1.5)	44,444,064 (2.0)	41,606,516 (1.9)	155,748,528 (7.2)	31,785,562 (1.4)	44,414,392 (2.1)	118,650,488 (5.5)	639,235,968 (29.3)
Developed	60,592,520 (21.3)	80,951,928 (27.5)	5,400,086 (1.8)	11,102,756 (3.7)	6,024,180 (2.0)	15,434,175 (5.4)	332,252 (0.1)	9,983,493 (3.4)	16,811,666 (5.7)	47,716,020 (16.6)
Afghanistan	7,332,846 (41.0)	4,238,545 (24.9)	63,781 (0.4)	315,433 (1.9)	440,995 (2.6)	1,239,438 (6.9)	376,116 (2.0)	450,584 (2.7)	772,277 (4.6)	4,566,996 (25.5)
Algeria	3,441,017 (24.1)	3,470,004 (25.8)	201,336 (1.5)	236,100 (1.8)	334,774 (2.6)	930,226 (6.6)	261,559 (1.6)	351,731 (2.7)	591,396 (4.5)	2,388,454 (16.8)
Angola	2,713,103 (21.3)	3,875,611 (32.4)	269,830 (2.5)	190,895 (1.8)	226,593 (2.1)	1,270,567 (10.3)	333,494 (2.2)	155,545 (1.5)	488,563 (4.4)	5,490,424 (43.2)
Argentina	2,160,695 (16.2)	3,761,645 (27.3)	227,945 (1.6)	339,210 (2.4)	278,913 (2.0)	691,635 (5.1)	3,179 (0.0)	603,244 (4.4)	275,705 (2.0)	2,012,420 (15.0)
Bangladesh	20,854,394 (33.4)	16,710,643 (25.5)	1,233,841 (1.9)	2,151,134 (3.2)	1,209,422 (1.8)	3,802,958 (6.0)	646,328 (1.1)	2,042,371 (3.1)	5,743,748 (8.7)	17,882,126 (28.4)
Brazil	7,029,418 (11.1)	19,921,510 (28.8)	1,259,185 (1.8)	2,443,170 (3.4)	1,634,301 (2.3)	6,052,039 (9.2)	581,602 (1.0)	3,586,669 (5.1)	2,995,137 (4.3)	16,326,374 (25.0)
Cameroon	2,827,804 (22.6)	2,398,197 (21.3)	190,652 (1.8)	209,882 (2.0)	227,608 (2.1)	1,032,729 (8.8)	250,795 (1.9)	227,137 (2.1)	541,121 (4.9)	4,793,160 (39.9)
China	75,771,496 (22.6)	96,197,600 (27.4)	2,265,622 (0.6)	7,576,406 (2.1)	5,283,304 (1.5)	19,313,980 (5.7)	2,186,853 (0.6)	3,939,810 (1.1)	6,980,461 (2.0)	66,767,232 (19.5)
Colombia	2,612,874 (14.8)	3,317,298 (18.4)	361,618 (2.0)	410,055 (2.2)	418,405 (2.3)	1,382,299 (7.7)	213,754 (1.2)	745,607 (4.1)	606,699 (3.3)	4,254,938 (23.9)
Cote d'Ivoire	2,869,279 (26.2)	2,764,364 (27.2)	181,328 (1.9)	167,405 (1.7)	204,280 (2.1)	1,008,279 (9.7)	233,121 (2.0)	203,593 (2.1)	482,507 (4.9)	5,860,560 (55.1)
Democratic Republic of the Congo	12,028,243 (30.4)	11,787,841 (32.5)	810,434 (2.4)	541,768 (1.7)	699,967 (2.1)	4,720,162 (12.8)	981,748 (2.2)	483,213 (1.5)	1,481,869 (4.4)	18,834,114 (49.3)
Egypt	9,012,794 (27.1)	7,656,056 (23.8)	370,386 (1.2)	1,190,205 (3.7)	825,220 (2.6)	2,364,621 (7.2)	510,698 (1.5)	749,422 (2.3)	1,505,614 (4.7)	10,056,616 (30.4)
Ethiopia	11,906,531 (22.7)	18,870,550 (37.1)	1,458,751 (3.0)	703,566 (1.5)	1,027,051 (2.1)	4,496,158 (8.9)	767,576 (1.4)	1,225,066 (2.5)	1,132,576 (2.3)	14,459,131 (28.3)
France	3,162,781 (20.6)	5,085,942 (32.5)	302,551 (1.9)	624,919 (4.0)	391,268 (2.5)	853,257 (5.9)	6,555 (0.0)	833,962 (5.3)	995,247 (6.3)	2,131,999 (13.8)
Germany	3,159,099 (22.0)	4,599,480 (29.7)	223,628 (1.4)	1,010,594 (6.3)	390,249 (2.5)	869,605 (5.9)	6,245 (0.0)	707,790 (4.5)	897,465 (5.7)	2,352,558 (16.1)
Ghana	3,279,134 (25.3)	2,446,959 (20.2)	269,538 (2.3)	173,416 (1.5)	248,948 (2.1)	1,073,870 (8.6)	135,832 (1.0)	245,960 (2.1)	579,341 (4.8)	5,862,193 (46.3)
India	147,866,688 (30.8)	144,154,592 (29.3)	7,943,998 (1.6)	9,226,282 (1.9)	9,112,211 (1.8)	32,171,082 (6.7)	10,306,493 (2.2)	9,776,147 (2.0)	45,574,424 (9.2)	165,971,520 (34.4)
Indonesia	23,082,472 (24.7)	19,602,020 (20.9)	604,057 (0.7)	1,232,236 (1.3)	1,418,120 (1.5)	7,193,820 (7.7)	1,007,852 (1.1)	993,326 (1.1)	4,704,706 (5.0)	25,875,604 (27.7)
Iran	5,400,623 (22.1)	5,761,539 (23.8)	425,132 (1.7)	660,969 (2.7)	610,969 (2.6)	1,510,187 (6.2)	430,757 (1.7)	642,066 (2.7)	1,193,648 (4.9)	6,171,506 (25.2)

Iraq	4,657,270 (26.9)	3,741,314 (22.9)	236,071 (1.7)	294,504 (1.9)	478,578 (2.9)	1,133,282 (6.6)	270,184 (1.5)	919,248 (5.6)	786,549 (4.9)	5,514,278 (32.2)
Italy	2,208,197 (19.3)	3,802,988 (31.9)	172,715 (1.4)	550,715 (4.5)	297,079 (2.5)	800,834 (6.9)	5,442 (0.0)	455,132 (3.8)	1,253,207 (10.5)	2,877,173 (25.0)
Japan	5,947,348 (27.2)	5,647,052 (24.5)	292,760 (1.2)	592,367 (2.5)	476,060 (2.0)	831,355 (3.8)	9,719 (0.0)	381,128 (1.6)	1,011,451 (4.3)	1,959,192 (8.8)
Kenya	4,945,485 (19.6)	6,308,646 (28.5)	685,965 (3.3)	350,701 (1.7)	439,564 (2.1)	2,096,825 (9.2)	340,966 (1.3)	319,931 (1.5)	702,950 (3.3)	10,051,371 (42.9)
Madagascar	3,398,545 (27.1)	2,534,052 (21.5)	361,294 (3.2)	160,125 (1.4)	238,143 (2.1)	1,221,466 (10.2)	179,199 (1.3)	179,241 (1.6)	280,226 (2.4)	4,636,076 (37.9)
Malaysia	1,658,848 (16.2)	2,250,309 (20.4)	81,936 (0.7)	149,345 (1.3)	166,296 (1.5)	575,626 (5.4)	21,918 (0.2)	285,860 (2.5)	383,955 (3.4)	2,533,710 (24.0)
Mexico	8,608,476 (18.5)	9,144,078 (19.1)	1,029,133 (2.1)	888,059 (1.8)	1,116,740 (2.3)	3,292,484 (7.0)	497,630 (1.1)	1,160,518 (2.4)	1,674,620 (3.4)	6,700,752 (14.4)
Morocco	3,020,575 (24.8)	3,683,524 (29.9)	169,903 (1.4)	340,260 (2.7)	314,774 (2.6)	891,072 (7.3)	202,905 (1.6)	326,990 (2.7)	527,746 (4.2)	3,517,012 (28.7)
Mozambique	3,569,652 (23.4)	2,923,215 (21.4)	376,918 (2.9)	166,509 (1.4)	269,505 (2.1)	1,319,990 (9.4)	195,956 (1.2)	200,002 (1.6)	371,252 (2.9)	4,984,920 (34.3)
Myanmar	3,749,215 (21.0)	3,763,255 (20.3)	123,529 (0.6)	229,676 (1.2)	281,221 (1.5)	1,579,330 (8.7)	105,457 (0.6)	204,372 (1.1)	911,798 (4.8)	6,276,282 (34.7)
Nepal	3,896,646 (31.0)	3,042,602 (23.2)	135,016 (1.0)	421,234 (3.2)	242,823 (1.8)	693,879 (5.4)	179,090 (1.5)	286,757 (2.2)	1,148,806 (8.6)	1,912,174 (15.0)
Niger	3,522,047 (30.9)	2,410,055 (25.6)	170,336 (2.0)	111,350 (1.4)	188,449 (2.1)	999,215 (9.8)	322,986 (2.5)	186,776 (2.1)	448,099 (4.9)	4,482,896 (41.9)
Nigeria	24,720,332 (24.9)	25,323,874 (29.4)	1,481,373 (1.8)	2,477,954 (3.1)	1,745,272 (2.1)	6,919,968 (7.6)	1,300,393 (1.2)	1,690,025 (2.0)	4,178,561 (4.9)	53,729,512 (56.8)
Pakistan	22,113,446 (27.1)	25,429,536 (30.8)	1,214,347 (1.5)	1,469,120 (1.8)	1,511,480 (1.8)	5,118,624 (6.3)	1,594,437 (2.0)	1,765,968 (2.1)	6,745,028 (8.2)	16,630,634 (20.3)
Peru	2,627,255 (22.8)	2,322,444 (19.6)	242,315 (2.0)	223,803 (1.9)	276,890 (2.3)	919,818 (7.9)	191,123 (1.7)	359,244 (3.0)	915,026 (7.7)	1,480,244 (12.7)
Philippines	11,150,432 (25.4)	9,307,344 (21.3)	275,411 (0.6)	1,026,651 (2.4)	659,048 (1.5)	3,972,324 (9.1)	381,269 (0.9)	463,169 (1.1)	2,098,499 (4.8)	8,347,250 (19.1)
Russia	6,090,342 (21.2)	4,833,236 (17.8)	523,996 (2.0)	636,408 (2.4)	547,980 (2.1)	1,796,431 (6.4)	90,226 (0.3)	494,719 (1.9)	1,971,138 (7.4)	3,447,237 (12.2)
Saudi Arabia	2,286,151 (21.5)	3,204,233 (32.4)	192,765 (1.9)	264,819 (2.7)	263,068 (2.6)	758,576 (7.3)	170,280 (1.6)	258,739 (2.6)	483,857 (4.9)	4,540,608 (43.4)
South Africa	5,159,018 (25.5)	5,397,856 (26.7)	348,786 (1.7)	408,048 (2.0)	415,093 (2.1)	1,726,566 (8.5)	241,299 (1.2)	672,602 (3.3)	890,644 (4.4)	2,835,948 (14.0)
South Korea	2,875,140 (28.0)	2,955,092 (24.9)	122,304 (0.9)	498,049 (3.8)	247,234 (2.1)	446,216 (2.1)	4,425 (0.0)	255,556 (2.1)	974,364 (7.9)	843,204 (7.9)
Sudan	6,138,748 (30.6)	4,588,169 (24.5)	223,781 (1.2)	473,051 (2.6)	473,888 (2.6)	1,502,186 (7.6)	412,693 (1.9)	490,279 (2.7)	902,967 (4.9)	4,400,068 (22.1)
Tanzania	6,867,952 (23.8)	7,587,108 (30.1)	751,729 (3.2)	320,849 (1.4)	499,204 (2.1)	2,059,415 (7.8)	430,098 (1.4)	370,869 (2.7)	653,218 (1.6)	9,701,801 (35.6)
Thailand	2,218,648 (13.7)	3,950,348 (22.3)	125,973 (0.7)	176,500 (0.9)	271,934 (1.5)	1,121,922 (6.7)	84,203 (0.6)	195,711 (1.1)	1,419,518 (7.8)	5,687,484 (34.2)
Turkey	6,251,246 (24.6)	8,073,130 (30.5)	387,904 (1.5)	873,888 (3.3)	680,494 (2.6)	1,503,149 (5.9)	407,041 (1.7)	734,689 (2.8)	1,997,641 (7.5)	5,650,598 (22.1)
Uganda	3,970,910 (16.1)	4,647,124 (22.2)	622,216 (3.2)	308,970 (1.6)	410,578 (2.1)	1,886,161 (8.7)	475,153 (1.8)	313,328 (1.6)	602,755 (3.1)	8,473,717 (37.8)

United Kingdom	2,966,546 (20.3)	5,018,414 (33.1)	181,497 (1.2)	648,266 (4.2)	376,388 (2.5)	819,044 (5.5)	6,741 (0.0)	390,157 (2.6)	924,021 (6.1)	2,619,553 (17.7)
United States	15,992,132 (19.3)	26,350,414 (30.7)	2,050,206 (2.4)	3,241,876 (3.7)	1,375,879 (1.6)	4,037,732 (4.8)	33,152 (0.0)	3,987,614 (4.6)	2,809,268 (3.2)	18,102,976 (21.6)
Uzbekistan	2,272,136 (20.4)	1,762,122 (15.4)	203,936 (1.7)	198,432 (1.7)	235,947 (2.1)	736,265 (6.5)	57,520 (0.5)	230,302 (2.0)	878,042 (7.7)	1,637,579 (14.5)
Venezuela	1,438,655 (12.6)	2,340,201 (20.4)	224,245 (1.9)	221,679 (1.9)	265,702 (2.3)	796,519 (7.0)	115,015 (1.0)	275,549 (2.4)	446,818 (3.9)	2,337,759 (20.5)
Vietnam	7,160,936 (25.5)	6,063,204 (20.7)	235,859 (0.8)	509,638 (1.7)	442,505 (1.5)	1,831,238 (6.4)	348,806 (1.3)	219,648 (0.7)	1,477,531 (4.9)	6,972,515 (24.4)
Yemen	5,108,383 (39.8)	3,214,463 (25.4)	49,653 (0.4)	190,046 (1.5)	338,034 (2.7)	869,423 (6.8)	216,751 (1.6)	335,131 (2.7)	600,865 (4.8)	3,989,276 (31.1)

Figure 3. Age-standardized DALY rate (per 100,000), ages 0 to 19, 2013

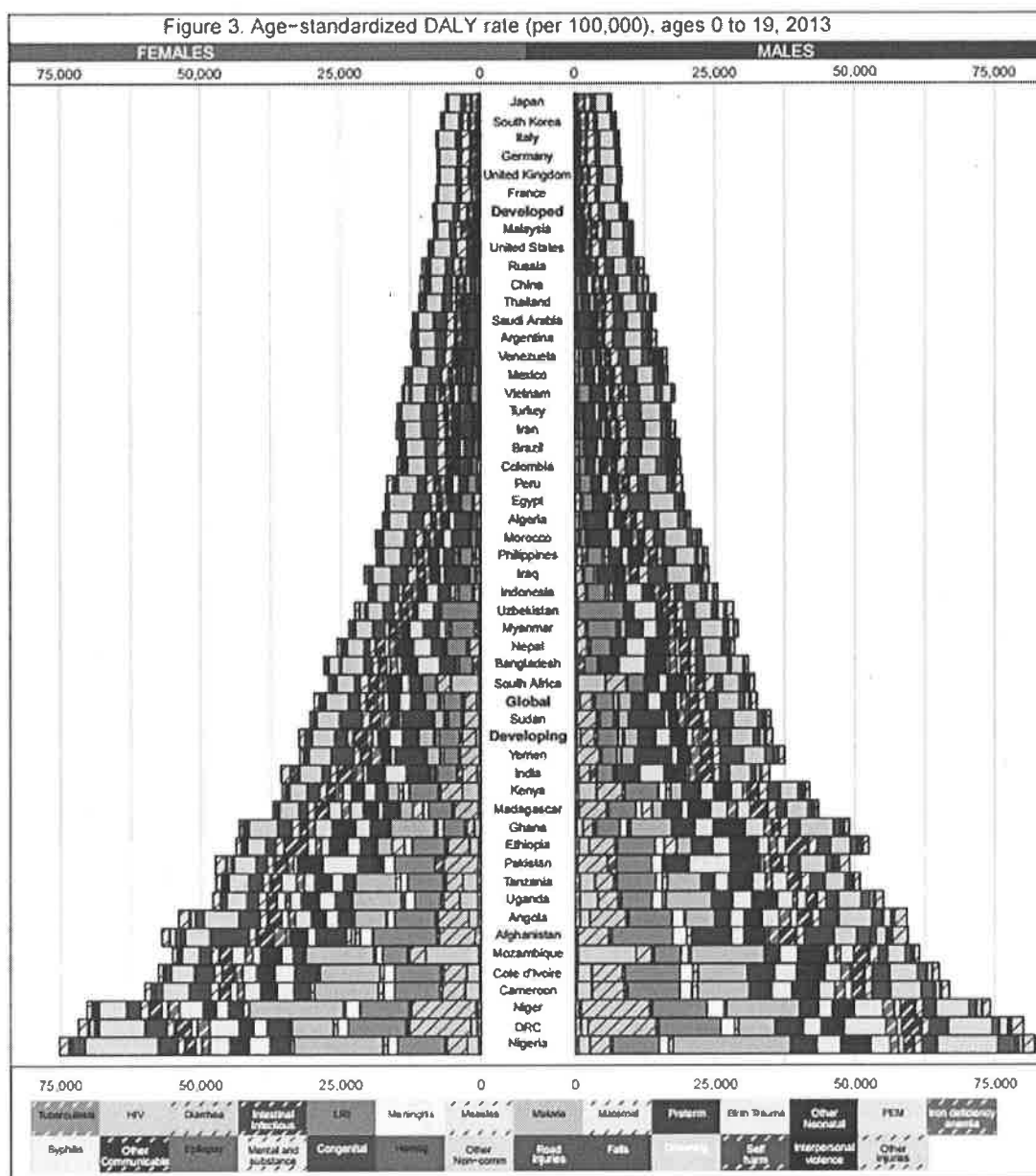


Figure 4a. Top 25 global causes of DALYs, ages 0 to 19, both sexes, 1990 and 2013

Figure 4a. Top 25 Global Causes of DALYs, Ages 0 to 19, Both Sexes, 1990 and 2013

1990 DALYs	1990 Leading Causes	2013 Leading Causes	2013 DALYs	% Change in DALY Counts	% Change in DALY Rates
196,734,064	1 Lower respiratory infections	1 Lower respiratory infections	83,453,288	-57.6 *	-58.8 *
156,920,016	2 Diarrheal diseases	2 Neonatal preterm birth	66,913,364	-51.3 *	-51.9 *
136,722,400	3 Neonatal preterm birth	3 Malaria	57,167,132	-5.5	-9.3
76,351,952	4 Neonatal encephalopathy	4 Neonatal encephalopathy	56,856,708	-25.4 *	-26.3 *
61,123,632	5 Congenital anomalies	5 Diarrheal diseases	55,076,972	-64.9 *	-66.1 *
59,355,096	6 Malaria	6 Congenital anomalies	48,243,644	-19.2 *	-21.3 *
50,314,268	7 Other neonatal	7 Neonatal sepsis	31,631,792	6.2	4.7
45,315,760	8 Measles	8 Iron-deficiency anemia	26,026,860	-21.8 *	-27.2 *
35,175,244	9 Protein-energy malnutrition	9 Other neonatal	24,690,226	-51.1 *	-51.8 *
34,482,508	10 Iron-deficiency anemia	10 Protein-energy malnutrition	23,275,150	-33.8 *	-35.9 *
30,791,336	11 Meningitis	11 Road injuries	17,315,342	-25.9 *	-31.8 *
29,904,474	12 Neonatal sepsis	12 Hemoglobinopathies	17,199,214	8.5	3.1
29,578,492	13 Drowning	13 Meningitis	16,299,012	-50.3 *	-52.2 *
25,211,894	14 Tetanus	14 HIV/AIDS	13,460,036	304.8 *	295.1 *
23,614,698	15 Road injuries	15 Skin diseases	13,201,860	11.2 *	0.4
20,804,222	16 STDs	16 Drowning	13,121,178	-57.3 *	-59.7 *
14,713,240	17 Intestinal infectious	17 Intestinal infectious	11,468,289	-21.9 *	-27.1 *
14,485,264	18 Hemoglobinopathies	18 STDs	11,276,496	-45.5 *	-46.8 *
13,969,256	19 Tuberculosis	19 Depressive disorders	8,720,946	22.4 *	8.3 *
11,866,152	20 Skin diseases	20 Measles	7,944,781	-83.0 *	-83.7 *
11,819,906	21 Whooping cough	21 Tuberculosis	6,620,938.5	-51.4 *	-54.7 *
11,435,010	22 Mechanical forces	22 Low back & neck pain	6,448,055	13.2 *	-0.5
9,606,849	23 Fire & heat	23 Conduct disorder	5,741,088	15.6 *	2.5 *
7,239,152.5	24 COPD	24 Sense organ diseases	5,623,924	-0.8	-9.6 *
7,099,481	25 Depressive disorders	25 Whooping cough	5,212,189	-56.2	-57.6
	33 Low back & neck pain	26 Mechanical forces			
	34 Sense organ diseases	31 Fire & heat			
	38 Conduct disorder	43 COPD			
	55 HIV/AIDS	44 Tetanus			

*Changes that are statistically significant.

Legend:
Communicable, maternal, neonatal and nutritional
Non-communicable
Injuries

Footnote 1 (Figure 4a): Causes connecting with lines show changes in ranks between 1990 and 2013. The second column on the right-hand side shows the mean DALY counts. The third and fourth columns on the right-hand side show the median percent changes (calculated at the 1000 draw level) in the number and rates of global DALYs.

Footnote 2 (Figure 4a): *Changes that are statistically significant.

Discussion

This is the first of a series of annual updates to identify levels and trends in the fatal and non-fatal burden of diseases and injuries among children and adolescents at the country-level. Of the 7.7 million deaths among children and adolescents globally in 2013, about 80% occurred among younger children. Of the 135.6 million YLDs among children and adolescents in 2013, about

60% of the YLDs were contributed by adolescents. Leading causes of death among children and adolescents in 2013 fell into four main categories: neonatal, congenital, infectious diseases and injuries. Developing and developed countries had both similarities and differences in the leading causes of death. In both sets of countries, preterm birth complications and congenital anomalies were common causes of death among children younger than five years, whereas injuries were major killers of adolescents. Infectious diseases including lower respiratory infections, neonatal sepsis, malaria, diarrheal diseases, HIV/AIDS, typhoid and tuberculosis remained major challenges in developing nations. In several countries, vaccine-preventable diseases such as measles and pertussis were still among the 10 leading causes of death, indicating a need to strengthen immunization programs in those countries. Leading causes of YLD largely overlapped among the three age groups, with iron deficiency anemia and skin diseases being the first and second common causes of YLD among children and adolescents.

Figure 4b. Top 25 Global Causes of DALYs, Under 5, Both Sexes, 1990 and 2013

1990 DALYs	1990 Leading Causes	2013 Leading Causes	2013 DALYs	% Change in DALY Counts	% Change in DALY Rates
186,064,688	1 Lower respiratory infections	1 Lower respiratory infections	77,833,178	-58.1 *	-59.4 *
141,961,888	2 Diarrheal diseases	2 Neonatal preterm birth	64,995,980	-52.4 *	-53.8 *
135,992,192	3 Neonatal preterm birth	3 Neonatal encephalopathy	56,070,636	-25.9 *	-28.1 *
75,854,408	4 Neonatal encephalopathy	4 Malaria	50,573,184	-1.2	-4.2
56,322,264	5 Congenital anomalies	5 Diarrheal diseases	48,496,548	-65.9 *	-67.0 *
50,254,368	6 Malaria	6 Congenital anomalies	43,394,044	-21.1 *	-23.5 *
50,034,704	7 Other neonatal	7 Neonatal sepsis	31,631,792	6.2	2.9
40,191,520	8 Measles	8 Other neonatal	24,124,848	-51.9 *	-53.4 *
33,228,548	9 Protein-energy malnutrition	9 Protein-energy malnutrition	21,744,328	-34.6 *	-36.6 *
29,904,474	10 Neonatal sepsis	10 Meningitis	12,305,894	-52.4 *	-53.8 *
25,749,860	11 Meningitis	11 Hemoglobinopathies	11,139,507	6.4	3.2
24,370,838	12 Tetanus	12 STDs	10,383,397	-45.7 *	-47.4 *
19,235,590	13 STDs	13 Iron-deficiency anemia	9,377,653	-33.6 *	-35.6 *
18,193,660	14 Drowning	14 Measles	6,990,036	-83.1 *	-83.6 *
14,219,549	15 Iron-deficiency anemia	16 Drowning	6,932,633	-63.0 *	-64.1 *
11,241,127	16 Whooping cough	16 Road injuries	5,822,856	-36.9 *	-38.9 *
9,434,525	17 Hemoglobinopathies	17 HIV/AIDS	5,517,001	82.3 *	76.7 *
9,310,316	18 Road injuries	18 Intestinal infectious	5,341,676	-24.4 *	-26.7 *
8,790,621	19 Mechanical forces	19 Whooping cough	4,932,885	-56.6	-57.9
7,710,265	20 Tuberculosis	20 Foreign body	4,159,089	-38.9	-40.8
7,027,280	21 Intestinal infectious	21 Tuberculosis	3,672,592	-50.4 *	-51.9 *
6,568,014	22 Foreign body	22 Other infectious	3,532,254	-25.6	-27.8
5,947,247	23 Fire & heat	23 Mechanical forces	3,190,592	-65.1	-66.2 *
5,740,204	24 Neonatal hemolytic	24 Fire & heat	2,729,898	-54.9 *	-56.3 *
5,269,538	25 COPD	25 Tetanus	2,721,063	-87.9 *	-88.3 *
	26 Other infectious	31 Neonatal hemolytic			
	33 HIV/AIDS	38 COPD			

*Changes that are statistically significant.

Legend:
Communicable, maternal, neonatal and nutritional
Non-communicable
Injuries

Footnote 1 (Figure 4b): Causes connecting with lines show changes in ranks between 1990 and 2013. The second column on the right-hand side shows the mean DALY counts. The third and fourth columns on the right-hand side show the median percent changes (calculated at the 1000 draw level) in the number and rates of global DALYs.

Footnote 2 (Figure 4b): *Changes that are statistically significant.

Trends from the leading causes of death in younger children varied widely across countries.

Countries with greater declines in all-cause child mortality tended to have a rapid decline in mortality rates for most of the main causes of death, suggesting that general improvements in health services and public health interventions for a wide range of health problems (e.g., improved management of childhood illnesses, immunization, mass distribution of insecticide-treated bed nets, and improved access to prenatal, obstetric and postnatal care) rather than single

disease programs determine success. The declines in poverty levels and improvements in living conditions over time might have also contributed to the declines in mortality. Countries with slowly declining or stagnant trends in all-cause under-five mortality generally showed similar trends in mortality rates for the leading causes. Most of these deaths, especially in developing countries, could be prevented by a concerted response from health systems and public health interventions.

The typical leading causes of death in younger children such as lower respiratory infections and diarrhea were also common causes of death for older children in many developing countries, indicating that interventions targeting the former should extend to cover the latter. Mortality and DALY rates for lower respiratory infections and diarrhea declined over the past 23 years, but they were still among the top five causes for both younger and older children in 2013. In fact, lower respiratory infections were the first leading cause of death among younger children, whereas diarrhea was the most common cause of death among older children. These deaths are largely avoidable through case identification and proper management and prevention of risk factors. Unsafe water, sanitation and hand washing practices are largely responsible for diarrheal deaths, whereas household air pollution and ambient air pollution are important risk factors for deaths from lower respiratory infections in both younger and older children, with undernutrition being an additional key risk factor for these two diseases among younger children.¹³ Proven interventions¹⁴⁻¹⁶ exist to reduce exposures to these risk factors but uptake is insufficient.

The decline in all-cause mortality rates among adolescents between 1990 and 2013 was slower than that among younger and older children. Road injuries were the leading cause of death among adolescents globally, with a stagnant or increasing trend in most developing countries. Many

countries inadequately implement proven road safety practices (e.g. safety measures for road users and vehicles, road infrastructure and post-crash care)¹⁷. With increasing motorization, these trends are likely to worsen unless decisive action is taken.

Self-harm was the second most common cause of injury-related death among adolescents. While the most common suicidal methods differ across geography, restricting access to common lethal means has proven to be effective in reducing suicide rates.^{18,19} For example, pesticide ingestion is a commonly used method of suicide among young people in developing countries.²⁰ Prohibition of toxic pesticides in Sri Lanka and South Korea has been shown to reduce both the overall and method specific suicide rates.^{21,22} National suicide prevention strategies can play a role in preventing suicide but such strategies are lacking in many countries worldwide.¹⁹ Mental and substance use disorders contributed to two-thirds of all suicide DALYs in the world, indicating the importance of early detection and effective management of these disorders as part of suicide prevention strategies.²³

Drowning was among the 10 leading causes of death among older children and adolescents and the 14th leading cause of death among younger children in 2013. Lack of barriers to water sites and absence of close supervision are key risk factors for drowning among younger children in both developing and developed countries.^{24,25} Older children and adolescents usually drown during non-recreational or daily activities in developing countries, but during recreational activities in developed countries.²⁶ Risk of death from drowning is especially high in rural areas in developing countries, where unfenced water sources are close to the homes, without any emergency medical care facilities or capacity to perform resuscitation for the drowning child.^{24,26} In developed

countries, failure to wear life jackets during boating activities and alcohol use among adolescents during water related recreation are among the risk factors for drowning.^{25,26}

In addition to injuries, infectious diseases were important causes of death among adolescents in developing countries, especially HIV/AIDS, lower respiratory infections, intestinal infectious diseases, diarrhea, malaria, and tuberculosis. The mortality rates for all these diseases except HIV/AIDS are decreasing. Deaths from HIV/AIDS among adolescents are concentrated in sub-Saharan Africa and have been increasing since 1990. This trend differs from that in all age groups, where it increased after 1990, peaked around 2005 and then declined steadily after antiretroviral treatment became more widely available.¹⁰ Low rates of HIV testing, an important step toward HIV treatment, and poor access to antiretroviral treatment among adolescents,²⁷ might explain some of the increases in HIV/AIDS mortality in this age group. Although much emphasis has been placed on prevention of HIV infections among adolescents, little attention has been given to the care of those who were infected during infancy.²⁸ High rates of children orphaned by HIV/AIDS, the necessity of guardian consent to undergo HIV testing, and the lack of clear policies and guidance regarding consent and HIV testing among minors are among the barriers to HIV testing and care for older children and adolescents.^{28,29}

Leading causes of disability among all children and adolescents were dominated by causes common in adolescents because of a larger share of YLDs by this age group. Iron deficiency anemia, the largest cause of disability, however, is common in both younger and older children and adolescents. The high demand of nutrients for growth, blood loss during menstruation in adolescent girls, and hookworm infections (especially in developing countries) put children and adolescents at risk for this deficiency. Although iron supplementation is effective, challenges

exist in terms of distribution, cost and compliance.³⁰ Other cost-effective interventions exist, including food fortification and biofortification of crops, with the latter being a way of reaching rural populations with limited access to marketed fortified foods.^{30,31}

Compared to changes in the causes of mortality which are generally showing decreasing rates in all age groups,¹ there are smaller changes, if at all, in the prevalence of many causes of disability (data not shown). The slow decline in disabling conditions is not specific to children and adolescents but a more common feature across the age span.⁵ Major depressive disorder, conduct disorder and anxiety disorders were major causes of disability among older children and adolescents in 2013. Whereas identification and treatment of these disorders are important, prevention of modifiable risk factors such as child abuse and neglect, bullying and intimate partner violence, should also be a priority.³² Other common causes of disability such as low back and neck pain, migraine, and skin disorders were also showing little change. Musculoskeletal disorders have drawn more attention since the GBD 2010, but there is still limited policy discussion on the approaches to deal with and/or prevent the leading causes of low back and neck pain.^{5,33,34} Migraine and other headache disorders generally attract low health-care priority despite the disability attributed to them.³⁵

Limitations

The general limitations of the GBD study also apply to this report. These limitations have been discussed widely and in detail in the published GBD 2013 papers and we summarized the relevant limitations here.^{1,2,5,6,10} First, there were variations in the instrument used for collection of verbal autopsy data, which might reduce the between-country comparability of cause of death

data. Moreover, the quality of the medical certification of causes of death (e.g. diagnostic accuracy), might have also influenced our estimates. Second, although redistribution of ill-defined or intermediate causes to specific underlying causes improved the comparability of cause of death data, it could yield results different from official statistics of countries. This could happen because the redistribution used global or regional algorithms, which did not pick up variations across countries in terms of certification practices or the timing of implementation of coding rules. We plan to use more country-specific redistribution algorithms in future rounds of the GBD. Third, the fact that the sum of cause-specific mortality estimates must equal all-cause mortality for a particular country, age, sex, and year, is a strength of the GBD approach, but it also has a limitation. Causes of death with very wide UIs (e.g. hemoglobinopathies) tend to be adjusted downwards relative to causes with narrower UIs. Fourth, in general, the epidemiological data coverage for the period 2006-2013 was relatively lower than the period 1998-2005 although there were variations by disease. For example, the percentages of countries that have epidemiological data on low back and neck pain for the period 1998-2005 and 2006-2013 were 41.5% and 13.3% respectively. The lower coverage for the latter might be explained by the lag in data collection, analyses and publications.⁵ For some diseases such as tuberculosis, the data coverage is higher for the recent years (91.5% for the period 1998-2005 versus 98.4% for 2006-2013). A systematic quantification of the geographical and temporal coverage of the input epidemiological data by cause has been reported in detail previously.⁵ Making estimates for every country over time is challenging especially for those with little or no data. We had to make use of sophisticated modeling techniques to borrow strength across geography and covariates to help predict for countries and years with sparse data. The lack of data for a particular geography is reflected by wider uncertainty intervals. Finally, for some causes of disability, long term consequences in later years of life are not reflected in this paper. For example, long term

impairments due to preterm birth complications, neonatal encephalopathy and Down's syndrome after age 19 were not counted in the DALY rankings since we focused only on the burden of disease experienced by those aged 0-19 years.

Conclusions

Understanding the levels and trends, as well as geography, of the leading causes of death and disability among children and adolescents is critical to guide investment and inform policies. Monitoring these trends over time is also key to understanding where interventions are having an impact, and where more attention is needed. The vast majority of deaths in children and adolescents are preventable. Proven interventions exist to prevent diarrheal and respiratory diseases, neonatal conditions, iron deficiency anemia, and road injuries, which result in some of the highest burdens of unnecessary death and disability among children and adolescents. The findings presented here show that these and other available interventions are underutilized and point to where more attention is needed. The findings point out that proven health interventions could save millions of lives. Despite the general decline in mortality, the speed of the decline could still be 'faster'.

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Conflict of Interest Disclosures: Dr. Kassebaum reports personal fees and non-financial support from Vifor Pharmaceuticals, Axon Communications LLC and Merck & Co outside the submitted work. KPG was awarded the NHMRC-Gustav Nossal Postgraduate Award sponsored by CSL; this award is peer reviewed and CSL had no part in selecting the awardee. Prof. Lotufo reports honoraria (modest) from Abbvie for one lecture. Walter Mendoza is program analyst at the UNFPA country office in Peru, which not necessarily endorses the study. Prof. Santos reports receiving a grant from São Paulo Research Foundation/FAPESP (Brazilian governmental research agency) for research purposes. In the past 3 years, Dr. Stein has received research grants and/or consultancy honoraria from AMBRF, Biocodex, Cipla, Lundbeck, National Responsible Gambling Foundation, Novartis, Servier, and Sun. No other conflicts are reported.

Funding/Support: The Institute for Health Metrics and Evaluation received funding from the Bill and Melinda Gates Foundation. Christina Fitzmaurice was supported by National Institutes of Health grant 5T32HL007093-40. Joseph Murray is supported by the Wellcome Trust [089963/Z/09/Z].

Role of the Funder/Sponsor: The funding institutions had no role in study design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Additional Contributions: Brent Christofferson, Rachel Fortunati, William Heisel, Kate Muller, Kevin O'Rourke, Amanda Pain, Kelsey Pierce, Logan Sanders, and Caitlyn Steiner contributed to the production of the manuscript. Katharine Looker provided HSV-2 seroprevalence data which inform the work. We would also like to thank all contributors to the Global Burden of Disease Study 2013.

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